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Caeran et al.

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[54] **SKATE WITH IN-LINE WHEELS**

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### Related U.S. Application Data

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Dec. 4, 1995	[IT]	Italy	TV95A0152

[51] **Int. Cl.**<sup>6</sup> ..... **A63C 17/06**; A63C 17/14

[52] **U.S. Cl.** ..... **280/11.15**; 280/11.2; 280/11.22;  
280/11.27; 280/11.34

[58] **Field of Search** ..... 280/11.19, 11.2,  
280/11.22, 11.26, 11.27, 11.15, 11.16, 11.34

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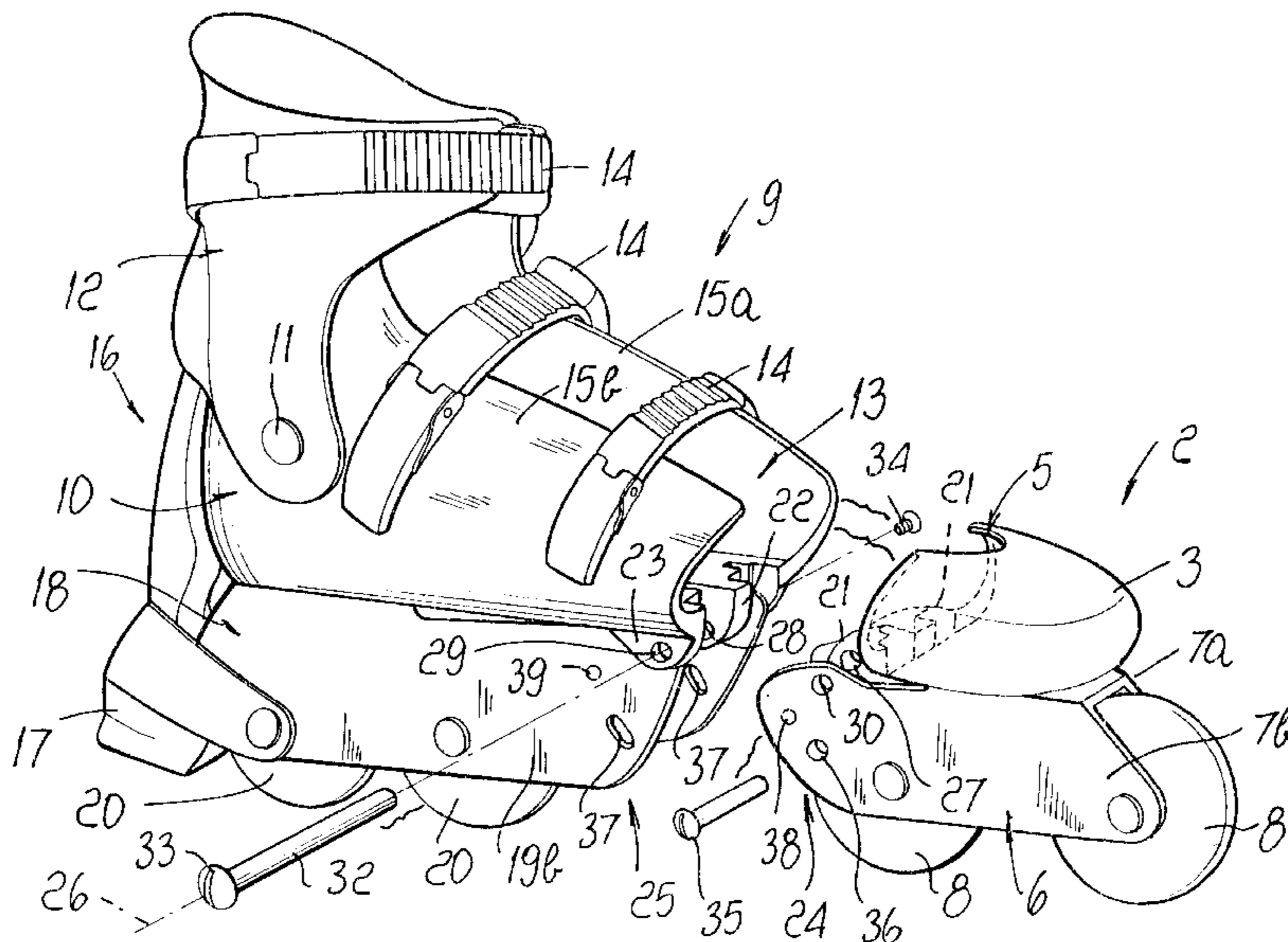
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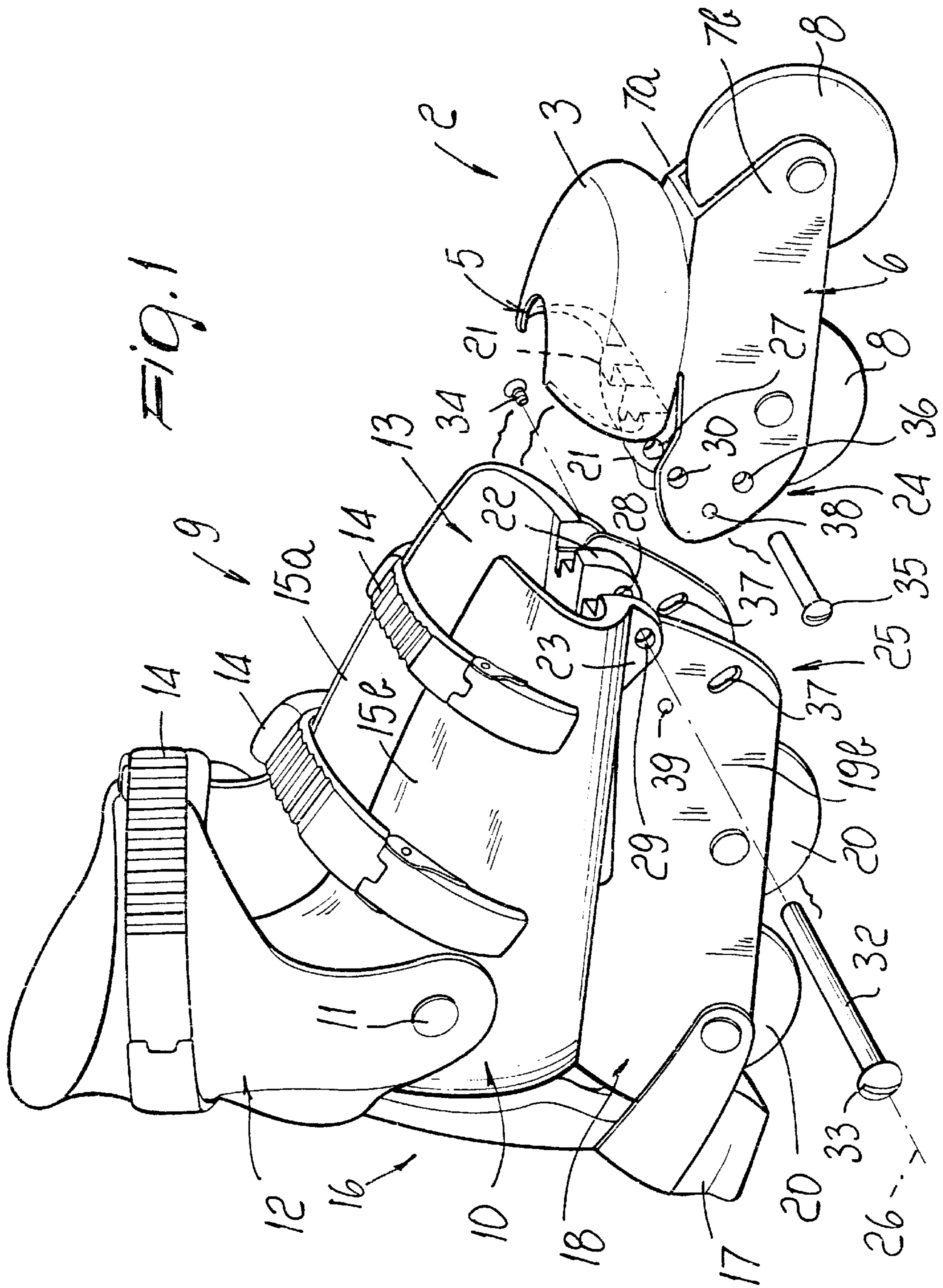
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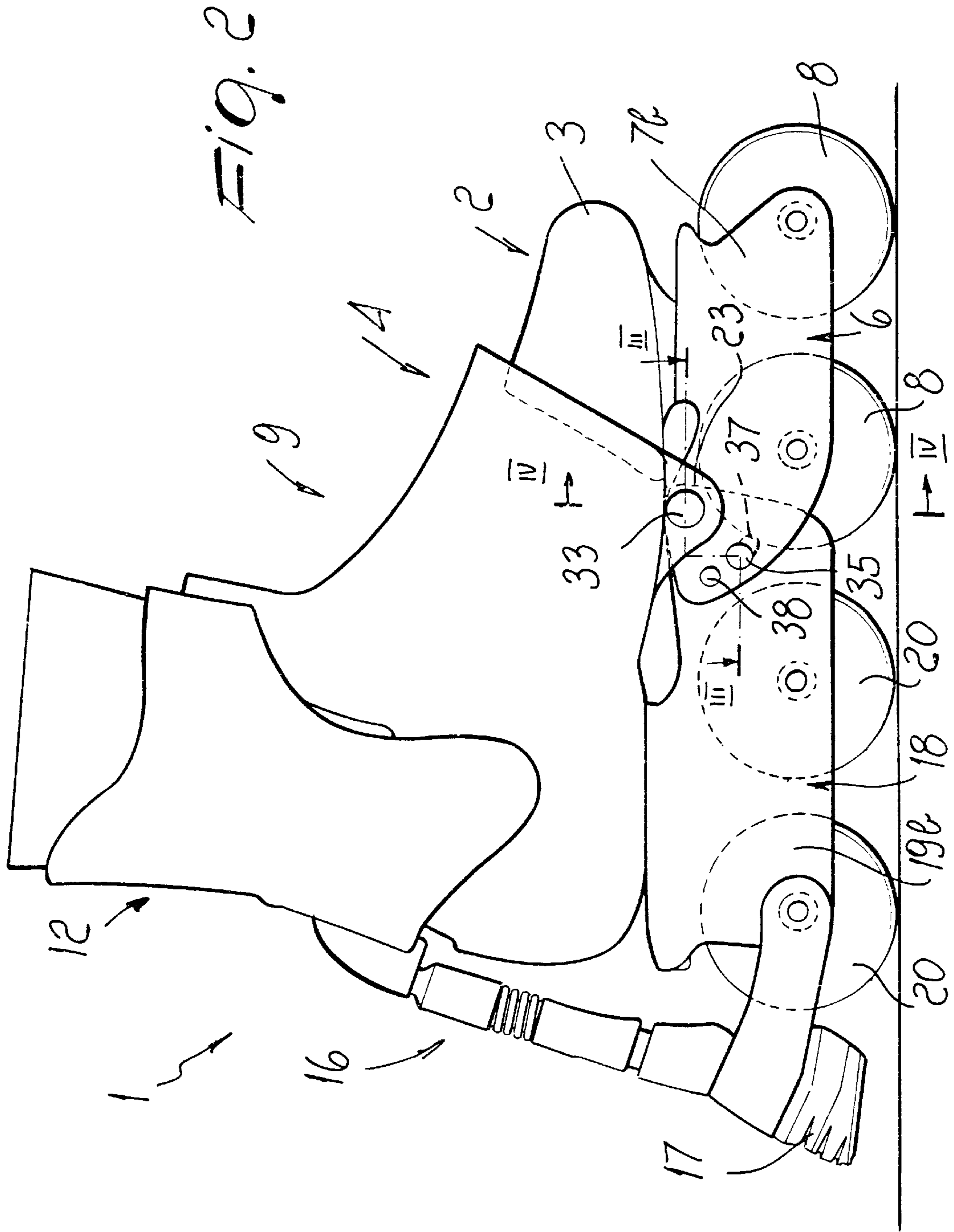
### [57] ABSTRACT

A skate with in-line wheels, having a first front body, for supporting and locking the front part of the foot, and a second rear body, for supporting and locking at least the heel, the bodies having a first frame and a second frame for supporting a plurality of wheels. The first and second bodies and the first and second supporting frames are rotatably associated to each other to allow better transmission of lateral forces during sports practice.

**29 Claims, 11 Drawing Sheets**









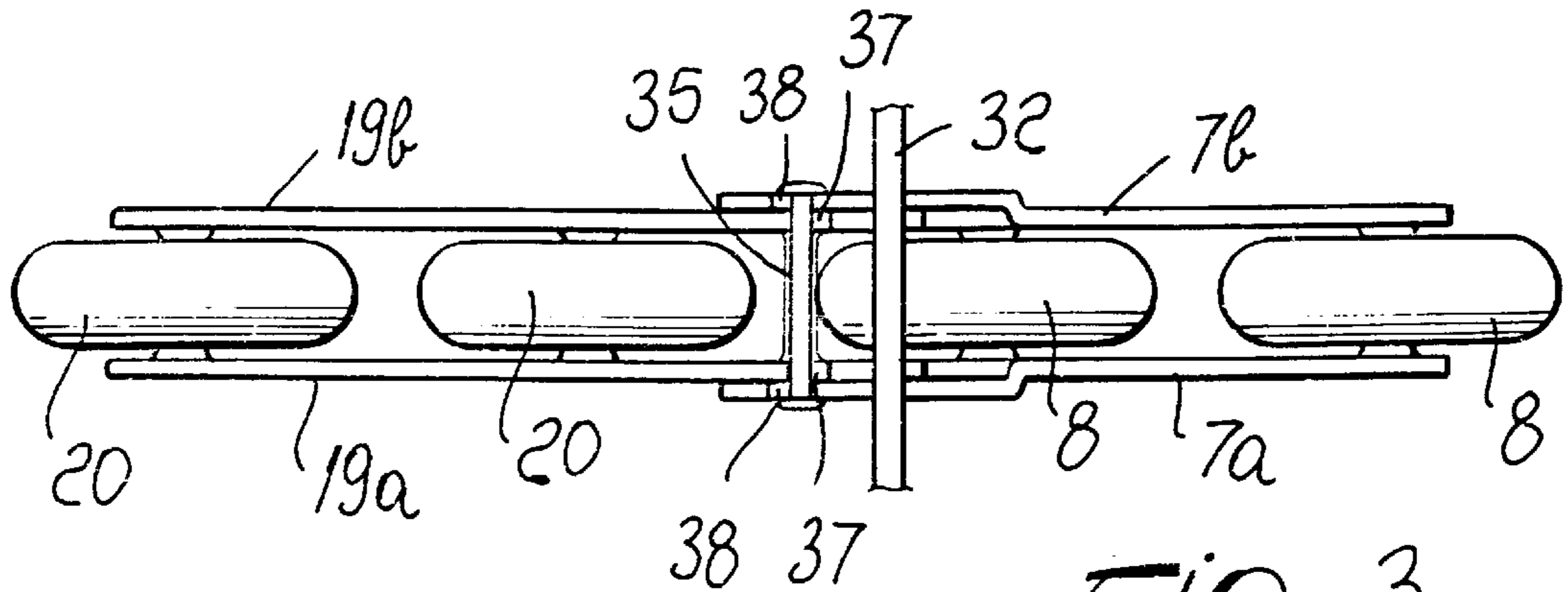


FIG. 3

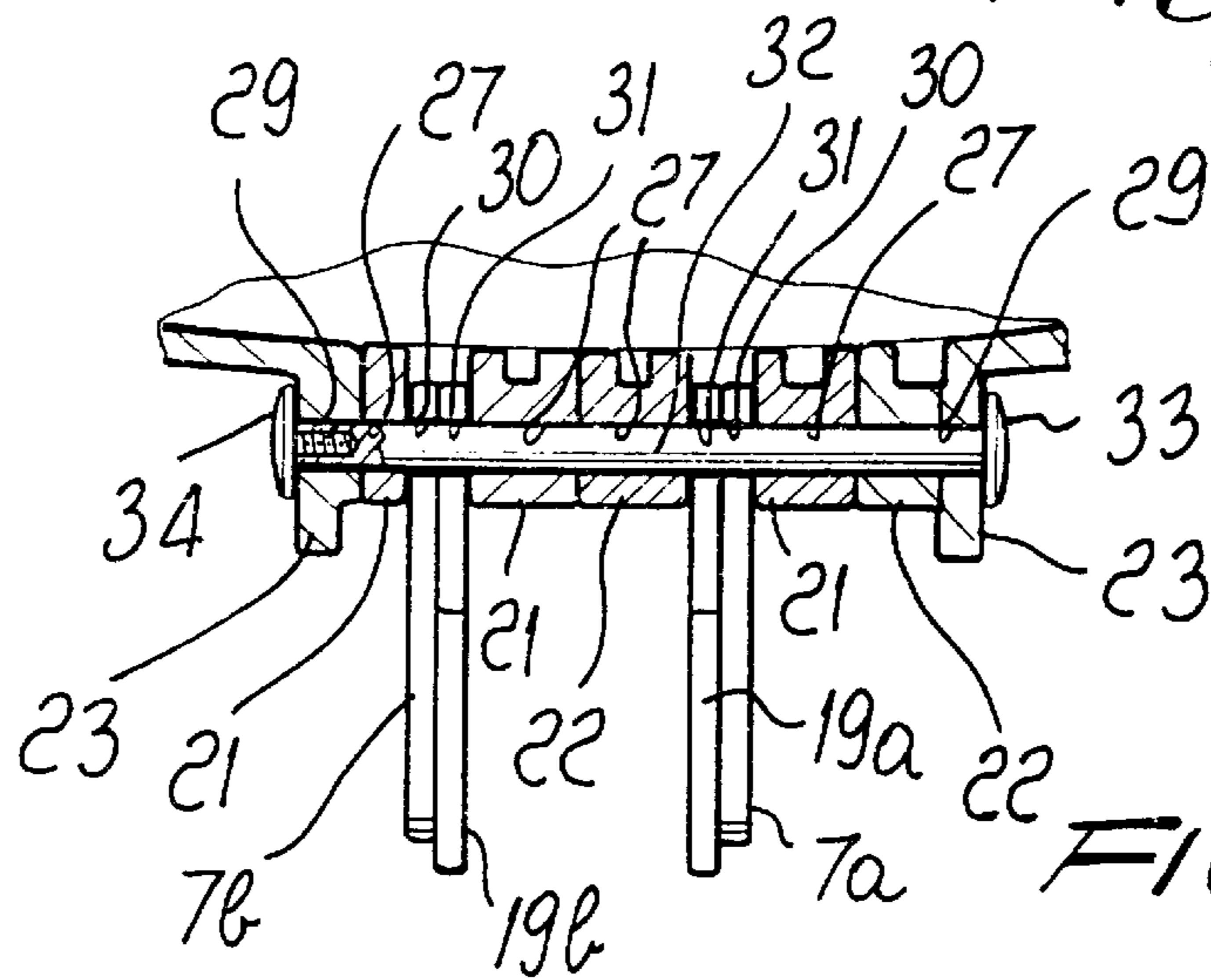


FIG. 4

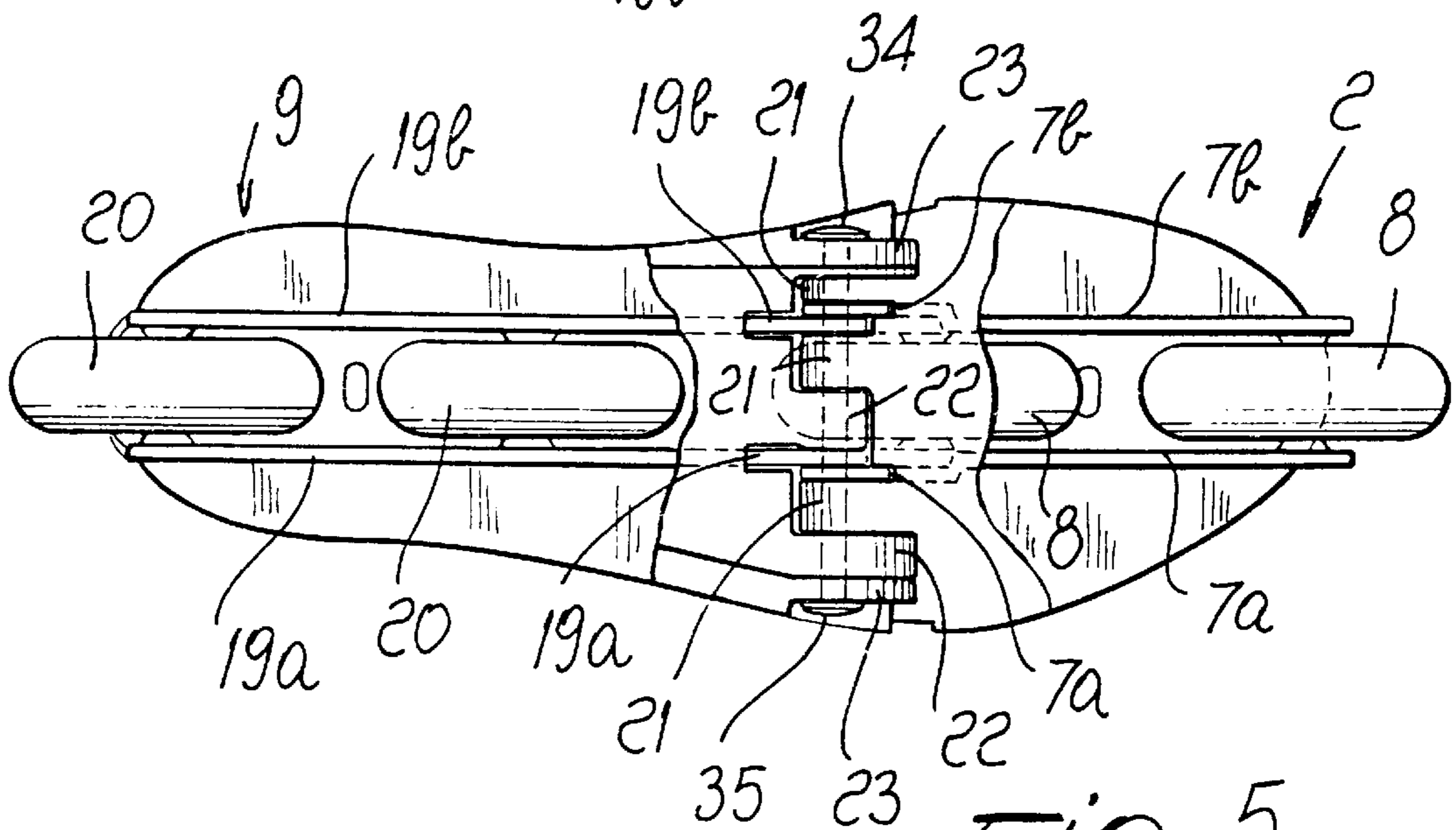


FIG. 5



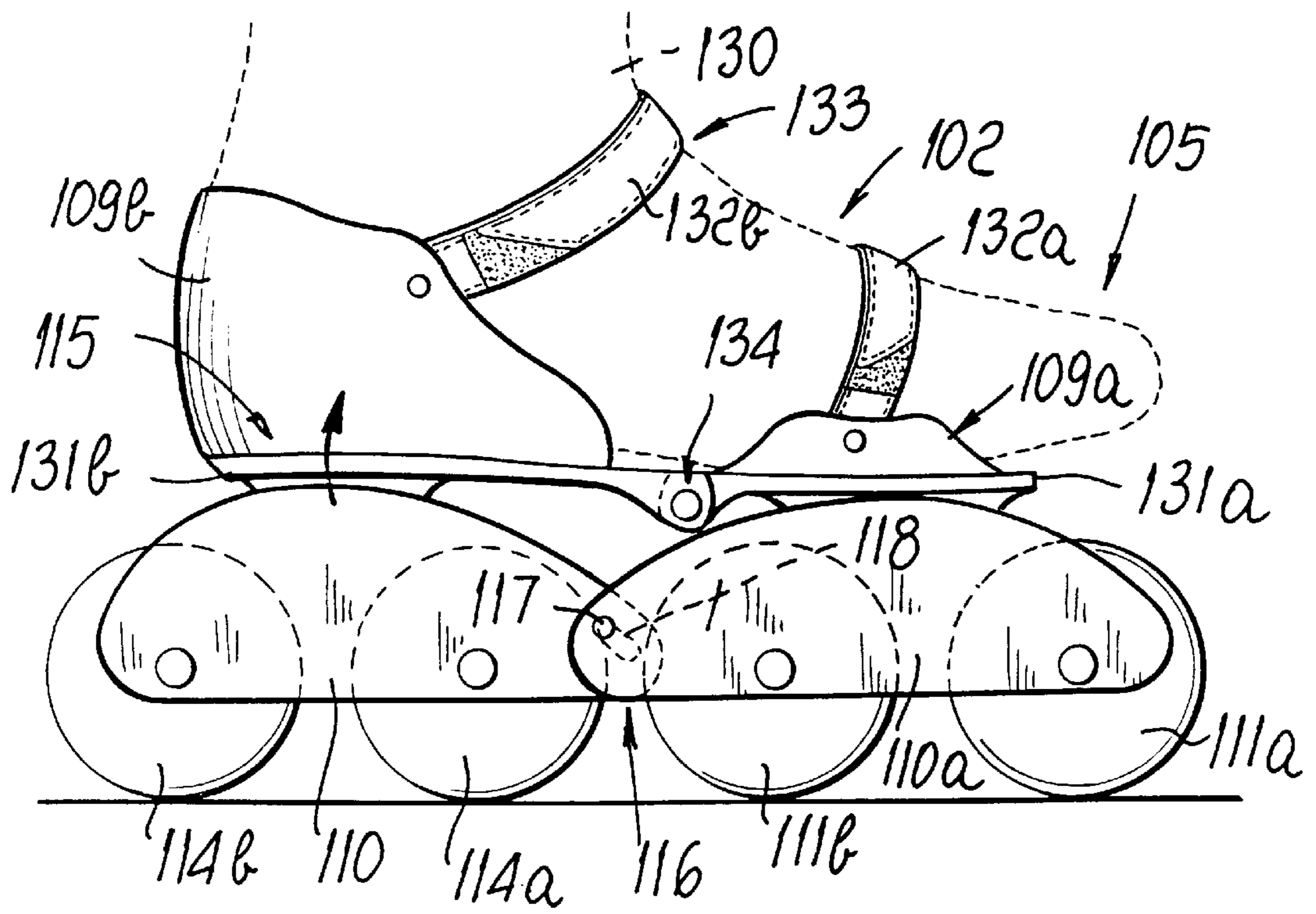


FIG. 7

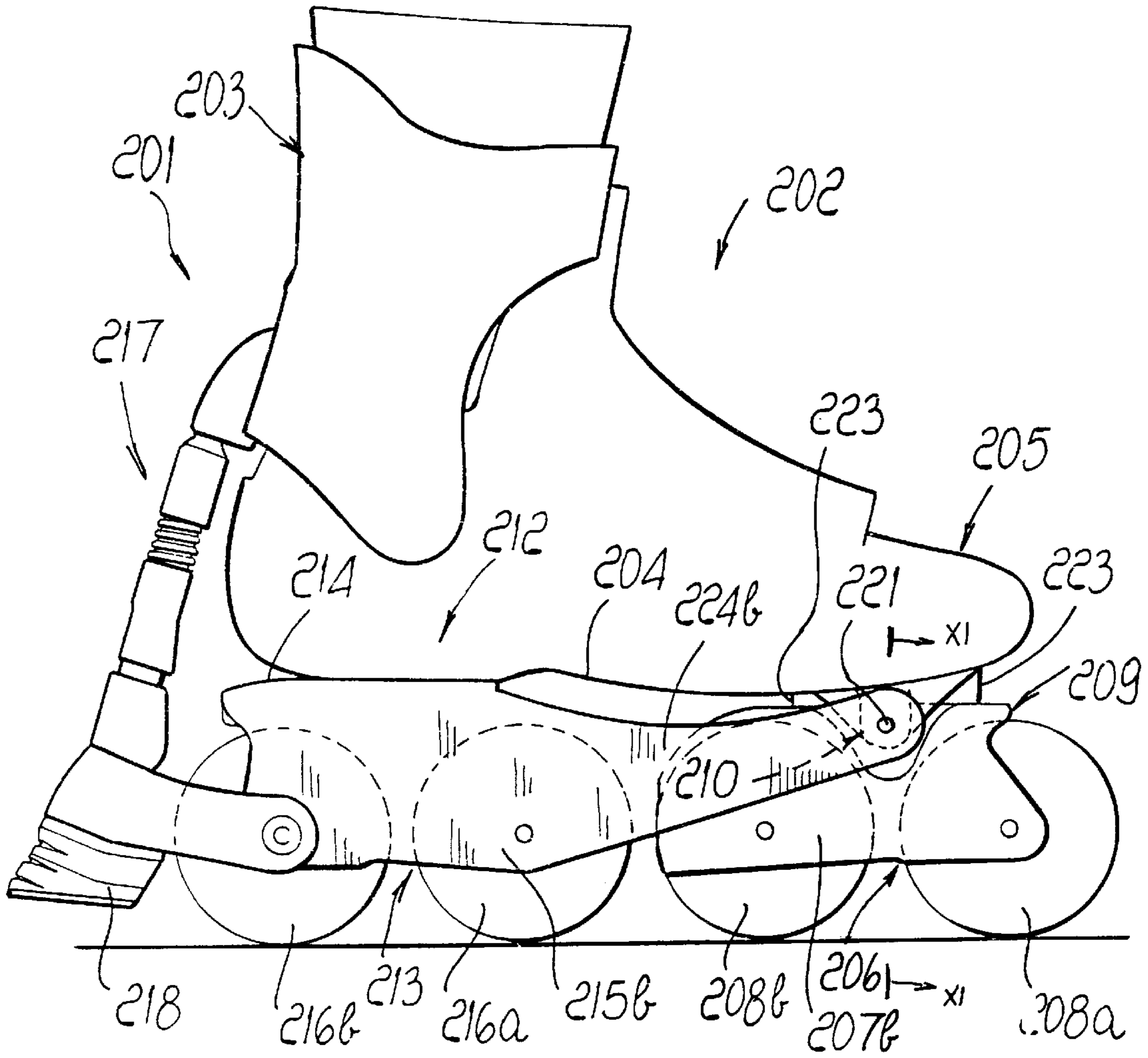


Fig. 8

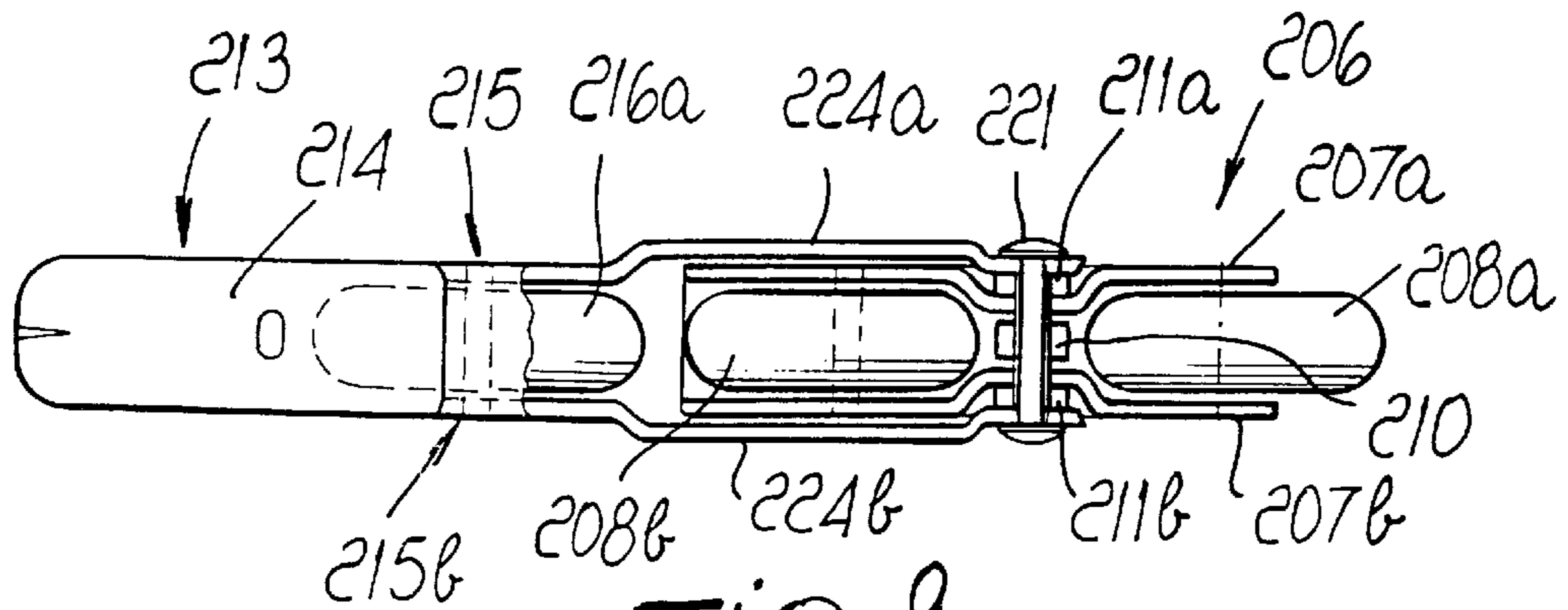
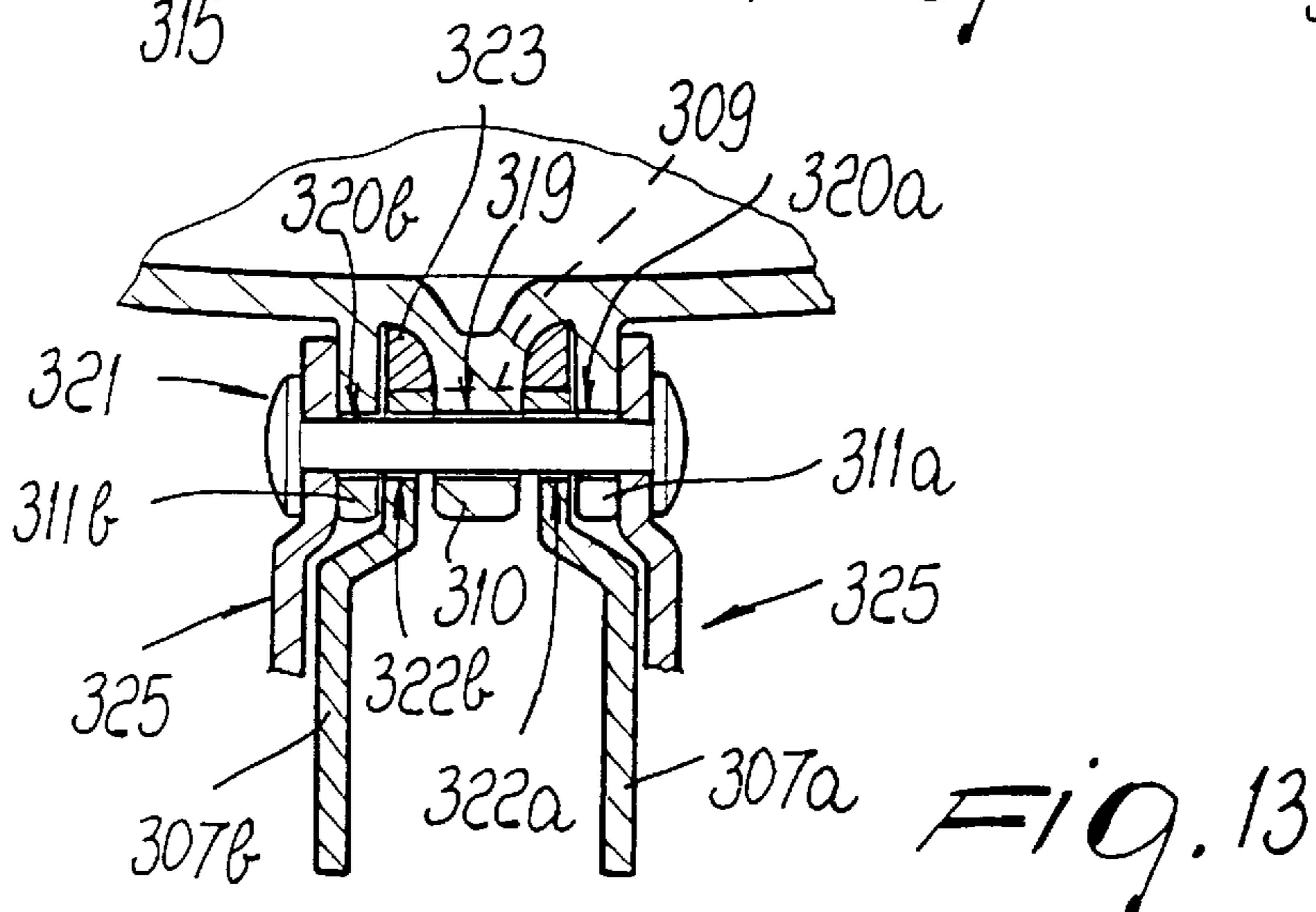
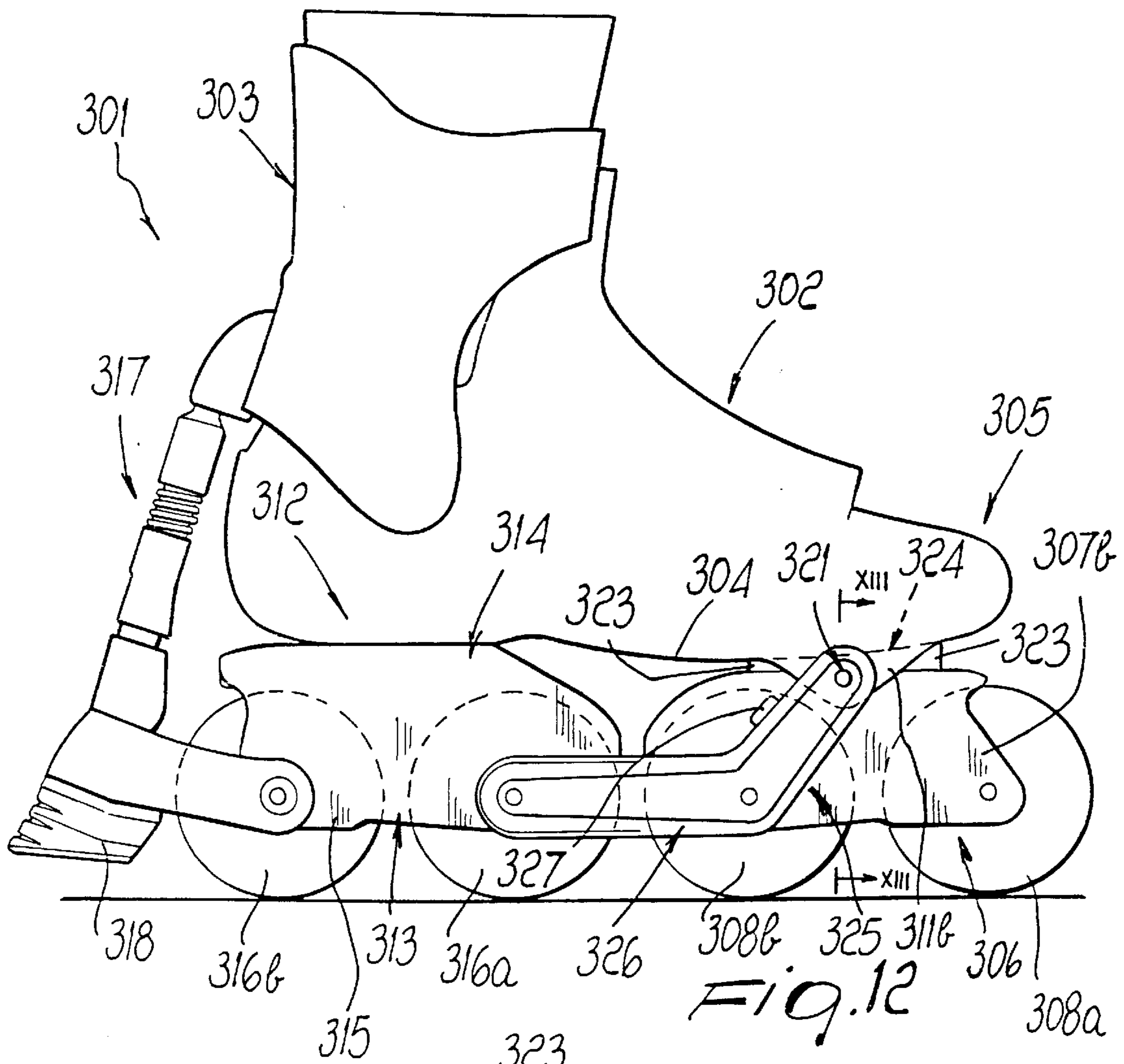


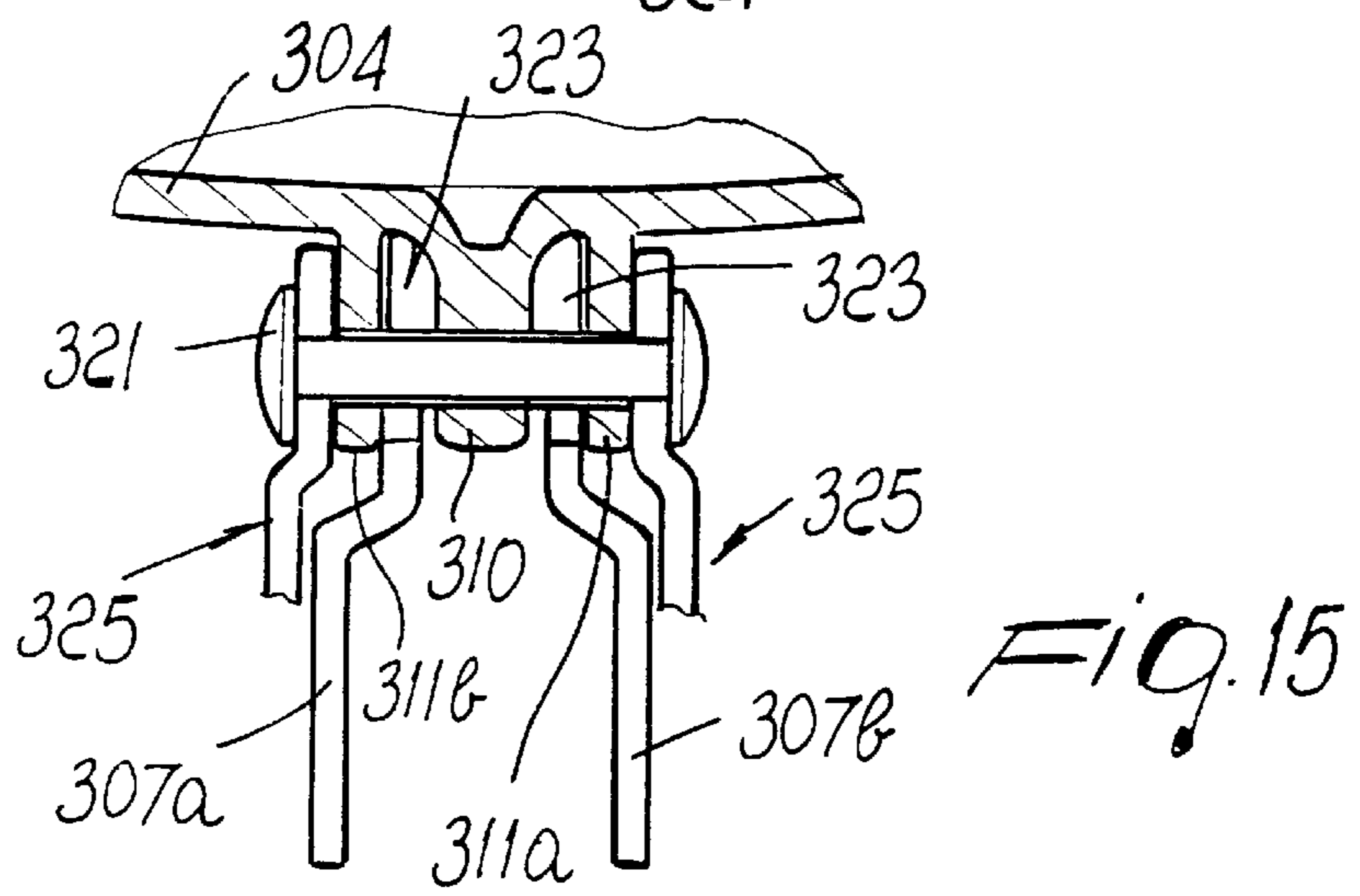
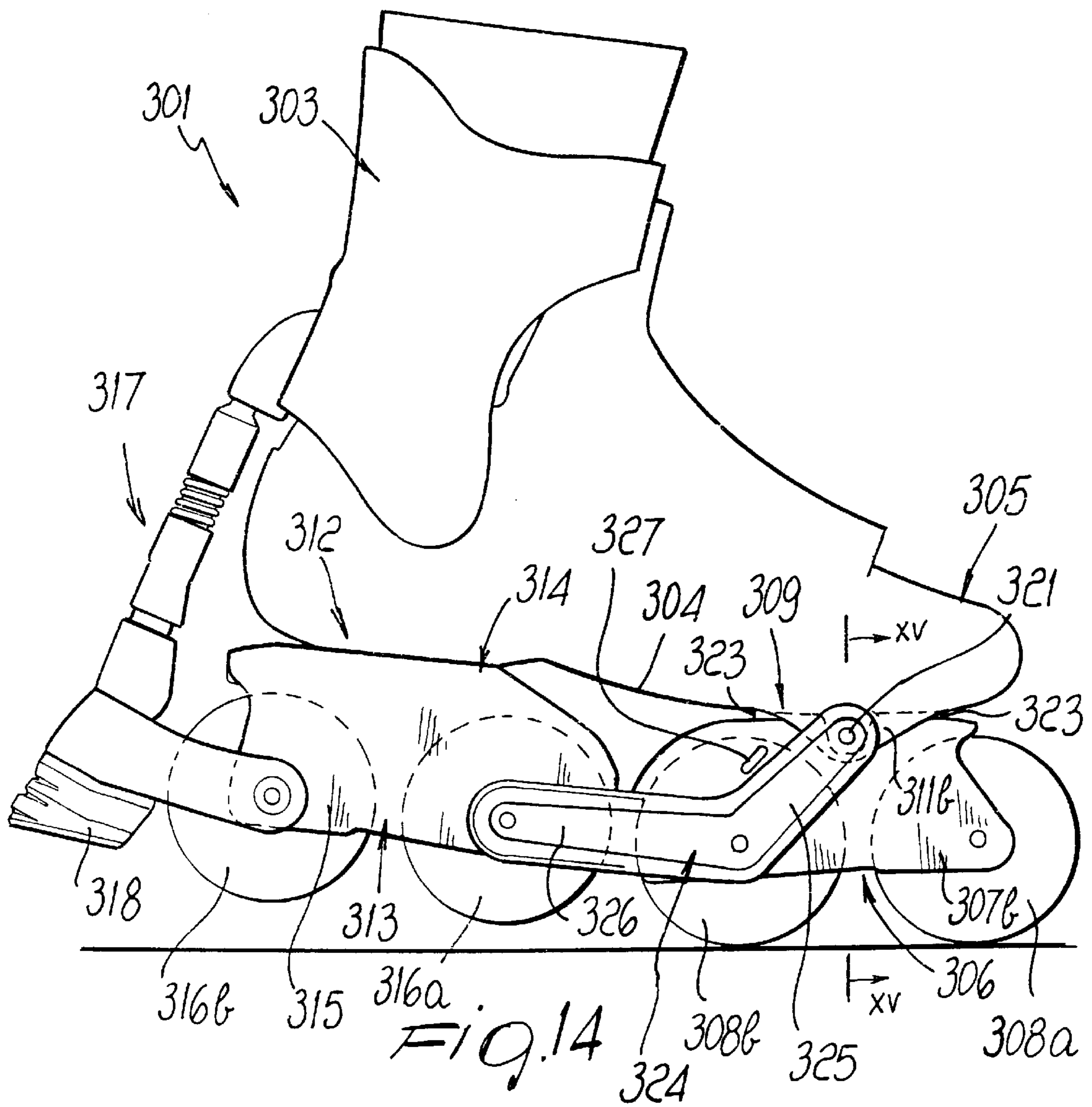
Fig. 9

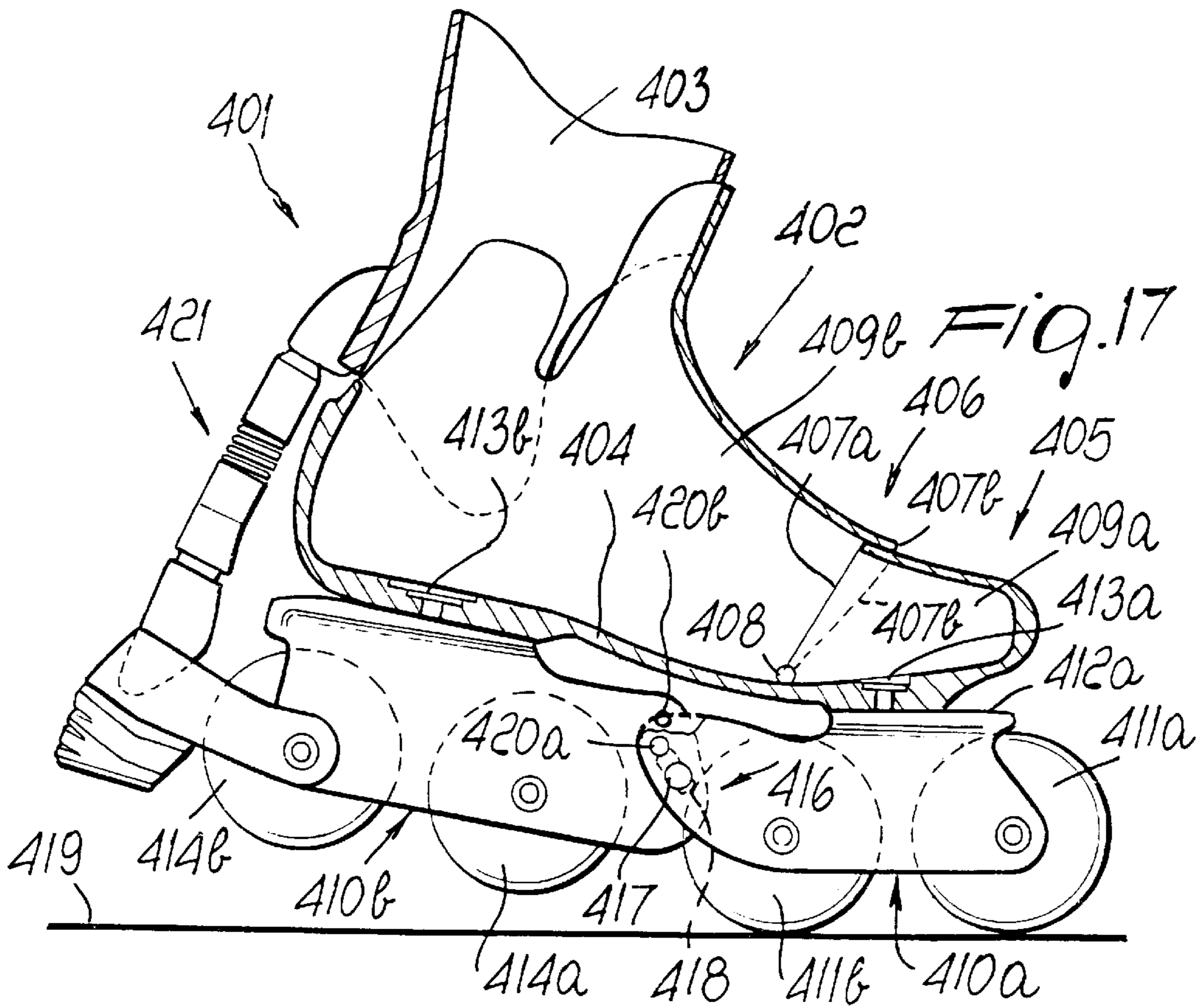
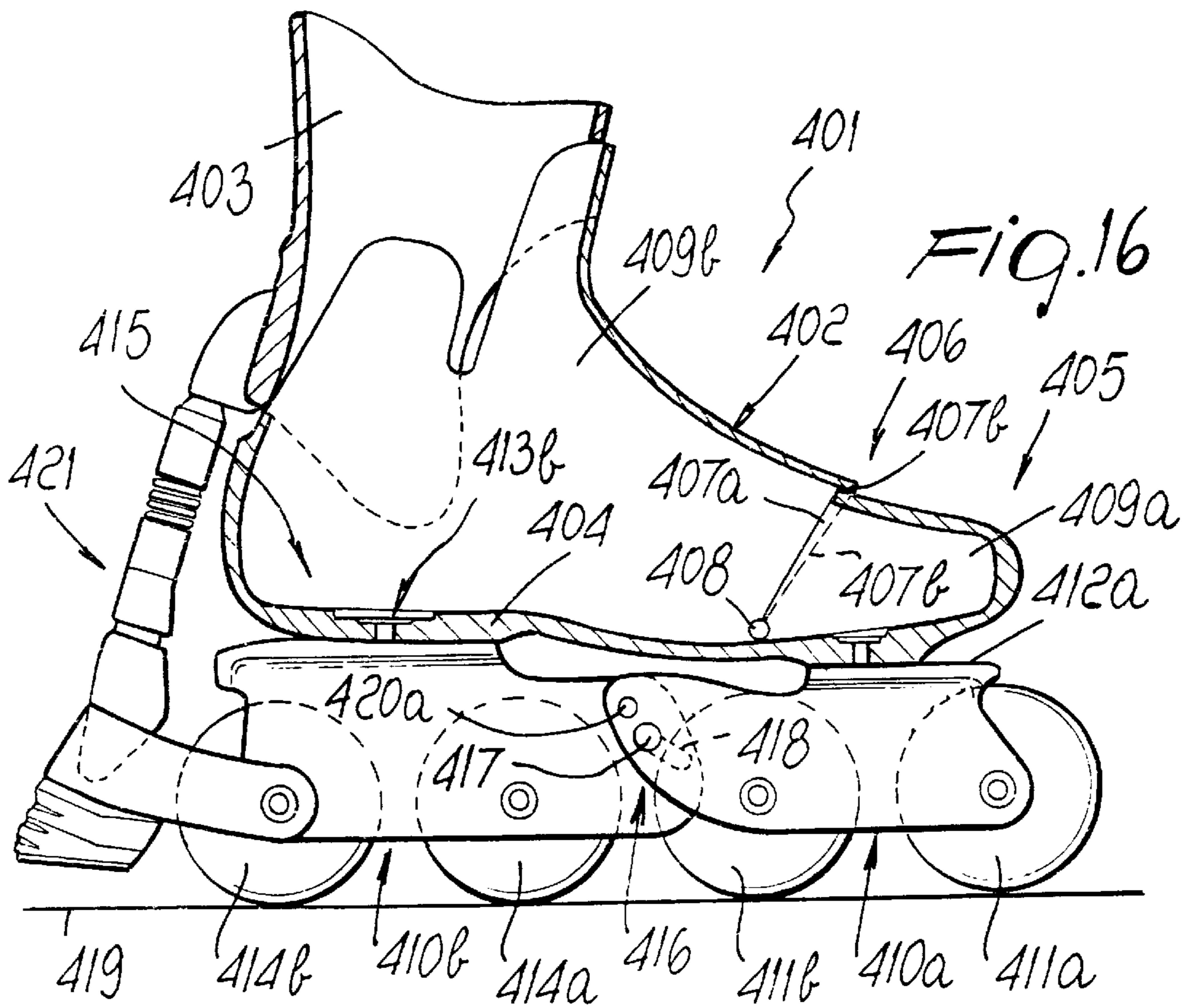


















## SKATE WITH IN-LINE WHEELS

### CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of application Ser. No. 08/451,621, filed on May 26, 1995, now U.S. Pat. No. 5,634,648.

### BACKGROUND OF THE INVENTION

The present invention relates to a skate with in-line wheels.

Conventional in-line roller skates comprise a shoe comprising a quarter articulated to a shell, which has a rigid sole that is associated, in a downward region, with a usually U-shaped support or frame between the wings whereof wheels are pivoted. The wheels are thus arranged in line with respect to each other.

These conventional skates have some drawbacks: when skating, and particularly during thrusting, difficulties are in fact encountered in optimally and completely transferring the thrust imparted by the user, thus decreasing the effectiveness of the thrust and the comfort for the foot.

The user in fact tends to transmit forces mainly at the region of the foot sole lying below the metatarsal region, but the rigidity of the support and of the sole of the shoe instead force him, during thrusting, to fully rest the foot sole on the shoe sole, so that the transmitted forces are divided between the wheels that are pivoted at the front and the wheels that are pivoted at the rear, with a consequent loss of effectiveness in thrusting.

U.S. patent application Ser. No. 08/451,621 filed May 26, 1995 discloses a roller skate with improved fit that is constituted by a first front body, for resting and locking the front part of the foot, and by a second rear body, for resting and locking at least the heel.

The first body and the second body are transversely rotationally associated to each other in a region that lies approximately above the pre-arch portion of the foot and in the interspace that lies between a first supporting frame and a second supporting frame for one or more wheels associated with said frames in a downward region.

Although this solution allows articulation of the shoe, it nonetheless has drawbacks: in fact, the rotation, stability, and overall rigidity of the skate are correlated only to the articulation point, which is not sufficient for their optimization.

These drawbacks are increased by the fact that during sports practice the skate is subjected, during periods of maximum thrusting, to continuous and often violent lateral stresses, as can occur for example when skating along a curve or during slalom skating or in particular during so-called "side-slip" braking.

The articulation point must therefore absorb all these applied stresses and at the same time ensure the rotation and rigidity of the shoe and good stability of the foot; however, these conditions cannot all be met simultaneously.

During skating, the foot is in fact subjected to considerable vibrations and lateral stresses that accordingly decrease the user's sensitivity in utilization and the lateral stability of the implement.

The user is also forced to increase the force in order to achieve optimum stability of the skate, with consequent tiring during exercise and reduction in comfort throughout sports practice.

## SUMMARY OF THE INVENTION

A principal aim of the present invention is therefore to solve the described problems, eliminating the drawbacks of the cited prior art by providing a skate that allows the user to transmit forces in an optimum manner during thrusting, at the same time allowing a correct anatomical movement of the foot.

Within the scope of this aim, an important object is to provide a skate that allows to transmit efforts during thrusting selectively only at the front part of the foot, at the same time allowing to achieve optimum lateral support of the skate during all phases of sports practice.

Another object is to provide a skate having increased operating sensitivity and comfort, particularly during periods of maximum thrusting.

Another important object is to provide a skate that allows to achieve the necessary assurances of stability for the user throughout sports practice.

Another object is to provide a skate that can be produced at low costs and with conventional machines and equipment.

This aim, these objects, and others that will become apparent hereinafter are achieved by a skate with in-line wheels characterized in that it comprises a first member and a second member, at least one of said members being adapted to support a plurality of in-line wheels, said first member being rotatably associated with said second member.

### BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the invention will become apparent from the following detailed description of a particular embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

FIG. 1 is an exploded view of the skate, wherein, for the sake of clarity, the third tabs that protrude from the first body have been omitted;

FIG. 2 is a side view of the skate, in which all the wheels touch the ground;

FIG. 3 is a sectional view, taken along the plane III—III of FIG. 2;

FIG. 4 is a sectional view, taken along the plane IV—IV of FIG. 2;

FIG. 5 is a partially sectional bottom view of the skate;

FIG. 6 is a view, similar to FIG. 2, of the skate during thrusting;

FIG. 7 is a view of a further embodiment;

FIG. 8 is a side view of the skate with in-line wheels in the inactive condition;

FIG. 9 is a partially sectional top view, taken at the tip region of the shell;

FIG. 10 is a side view of the skate during thrusting while skating;

FIG. 11 is a sectional view, taken along the plane XI—XI of FIG. 10;

FIG. 12 is a side view of the skate with in-line wheels in the inactive condition;

FIG. 13 is a sectional view, taken along the plane XIII—XIII of FIG. 12;

FIG. 14 is a side view of the skate during thrusting while skating;

FIG. 15 is a sectional view, taken along the plane XV—XV of FIG. 14;



FIG. 16 is a partially sectional side view of the skate with in-line wheels;

FIG. 17 is a view of the skate of FIG. 16 in the thrusting step during sports practice;

FIG. 18 is a partially sectional side view of still a further embodiment of the skate.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the above figures, the reference numeral 1 designates a skate that is constituted by a first front body 2 that forms the tip 3 of a shell 4 that surrounds the front region of the foot and locks it, and has an upper longitudinal slot 5.

A first supporting frame 6 is associated below the first body 2 in the particular illustrated embodiment; said frame is substantially U-shaped, and at least two first in-line wheels 8 are rotatably associated between the first wings 7a and 7b of said frame 6.

The skate comprises a second rear body 9 that is constituted by a heel cup 10 that wraps around part of the leg and of the foot up to the vicinity of the foot flexing region; a cuff 12 that wraps around the tibial region is optionally but not necessarily pivoted laterally to said heel cup at an adapted pair of studs 11.

The second rear body 9 also has a longitudinal front opening 13 for the insertion of, for example, a soft innerboot or directly of the user's foot; the foot is secured by adapted levers 14 that transversely connect the flaps 15a and 15b of the second rear body 9.

An adapted brake 16 can be associated at the cuff 12 and has a pad 17 that interacts with the ground when said cuff is rotated backwards.

A second supporting frame 18 is associated below the heel region of the second body 9; in a transverse cross-section said frame is U-shaped, and second in-line wheels 20 are rotatably associated between the second wings 19a and 19b of said second frame.

The first body and the second body, as well as the first and second supporting frames, are transversely and rotatably associated together, and guiding and sliding means are provided on said first and second frames.

Rotary coupling is allowed by the presence of a plurality of first tabs 21 that protrude downward and axially with respect to the first body 2, both in the interspace lying between the two first wings 7a and 7b of the first frame 6 and outside the frame, and by a plurality of second tabs 22, which protrude downward and axially at the end of the second body 2 that is directed towards the first body 6, both in the interspace lying between the second wings 19a and 19b and in a region lying outside them.

The first and second tabs therefore have a comb-shaped configuration and can be arranged adjacent to each other when the first body 2 is joined axially to the second body 9.

Third tabs 23 protrude, at the end of the second body 9 that has the second tabs 22, below the second wings 19a and 19b and outside them.

Adapted first holes 27, second hole 28, third holes 29, fourth holes 30, and fifth holes 31 are formed, along the same axis 26, on the first, second, and third tabs, as well as on the first ends 24 and on the second ends 25 of the first frame 6 and of the second frame 18; all of said holes form a seat for a first pivot 32.

Said first pivot 32 has a head 33 that abuts against one of the third tabs 23 and a stem that is internally threaded, at the

other end, for coupling to a complementarily threaded first screw 34 that abuts at the other third tab 23.

The skate furthermore comprises guiding and sliding means provided on the first and on the second frames; said means are constituted by a second pivot 35 that passes at two sixth holes 36 formed at the ends of the first wings 7a and 7b that partially laterally wrap around the corresponding ends of the second wings 19a and 19b of the second frame 18.

The sliding of the first and second ends of the first and second frames is allowed by the presence of two adapted slots 37 that are formed on the ends of the second wings 19a and 19b; said slots have a curved shape that allows the second body 9 to rise from the ground during thrusting, when the first wheels 8 are in contact with said ground.

The two slots 37 are of course formed on the second wings 19a and 19b at the sixth holes 36 provided on the first wings 7a and 7b of the first frame 6.

A seventh hole 38 and an eighth hole 39 are advantageously formed, respectively on the first wings and on the second wings of the first and second frames, so that they are adjacent to the sixth holes 36 and to the pair of slots 37; said holes 38 and 39 have the same axis when both the first wheels 8 and the second wheels 20 interact with the ground and therefore when the skate is in a horizontal condition.

In this condition it is thus possible, by inserting a pin or pivot in the seventh hole 38 and in the eighth hole 39, to lock the sliding of the first and second frames, which therefore cannot rotate at the axis 26.

The first pivot 32 and the second pivot 35 of course act at the interspace between a first wheel 8 and a second wheel 20 that are adjacent to each other.

Use of the invention is thus as follows: once the first and second frames and the first and second bodies have been associated one another by means of the first pivot 32 and the second pivot 35, the skater can achieve optimum lateral thrusting, since the second body can rotate, rising from the ground, allowing to concentrate the forces on the first wheels 8, while lateral forces can still be transmitted by virtue of the partial overlap of the first and second wings of the first and second frames; the sliding of the second pivot 35 in the slot 37 allows to achieve guided lifting of the second frame 18 with respect to the first frame 6.

It has thus been observed that the invention has achieved the intended aim and objects, a skate having been obtained which allows the user to transmit forces in an optimum manner during thrusting, at the same time allowing a correct anatomical movement of the foot; during thrusting, said forces can be selectively concentrated exclusively at the front part of the foot, at the same time allowing to achieve optimum lateral containment of the skate throughout sports practice.

The invention is of course susceptible of numerous modifications and variations, all of which are within the scope of the same inventive concept.

Thus, for example, FIG. 7 illustrates a second embodiment, in which the reference numeral 101 designates a skate constituted by a shell 102 with which a quarter, not shown, can be articulated at the malleolar region by means of appropriate studs or rivets.

The shell 102 is constituted by a first body 109a, which is U-shaped in transverse cross-section and is constituted by a first flat support 131a, from which two lateral shoulders protrude upwardly; said shoulders allow to contain the front part of a shoe 130 or the foot at the tip region 105.



The first body **109a** has a first strap **132a** the ends whereof are associable with the two lateral shoulders; said first strap **132a** allows to secure the shoe **130** or the foot.

The shell **102** has a second body **109b**, which is constituted by a second flat support **131b**, from which a heel cup protrudes perimetrically and upwardly and is adapted to contain at least the heel region **115** of the shoe **130**.

The second body **109b** has a second strap **132b** the ends whereof are laterally associated with the heel cup; said strap provides securing at the foot instep region **133**.

The first and second bodies **109a** and **109b** can be transversely and rotatably associated, at their ends which can be placed adjacent to each other, by means of a hinge-like articulation that comprises an adapted screw or a connecting pivot **134**.

A first frame **110a** and a second frame **110b** are associated respectively with the first body **109a** and with the second body **109b**; both frames are U-shaped, and at least two first and second wheels **111a** and **111b**, **114a** and **114b** are respectively pivoted between the first and second wings, which protrude downwardly, of said frames.

The center distance of the second wings of the second frame **110b** is smaller than the center distance of the first wings of the first frame **110a**, so as to allow the partial insertion and adjacent arrangement of the second wings with respect to the first wings on an approximately parallel plane.

The first frame **110a** and the second frame **110b** have means **116** for mutual guiding and sliding.

Said means **116** are constituted by a pin **117** that is associated and blended, at right angles, with the tips of the first wings of the first frame **110a** in a region that is intermediate between two of said first and second wheels that are adjacent to each other; the first pin **117** slides at a slot **118** that is formed on the second wings of the second frame **110b** that are arranged adjacent to the first wings of the first frame **110a**.

The slot **118** is arc-shaped, with its concavity directed at the tip region **105**.

This solution, too, allows to achieve the intended aim and objects.

With reference to FIGS. **8–11**, the reference numeral **201** designates a skate constituted by a shell **202**, to which it is possible to articulate a quarter **203** associated at the malleolar region by means of appropriate studs or rivets.

The shell **202** is formed monolithically, is preferably made of plastics, and has a lower region that forms a sole **204**.

A first frame **206** is associated below the sole **204** in the metatarsal region **205** and is U-shaped in transverse cross-section; at least one pair of first wheels **208a** and **208b** is pivoted between the first wings **207a** and **207b** of said first frame, which protrude towards the ground.

The first frame **206** has a first base **209** for connecting the first wings **207a** and **207b**; said base is perforated, so as to form a seat for the positioning of a first tab **210** in said base, and said first tab protrudes below the sole **204** in the metatarsal region **205**.

A pair of second tabs **211a** and **211b** also protrudes below the sole **204** so as to lie approximately parallel to the first tab; said second tabs are arranged externally with respect to the first wings **207a** and **207b** of the first frame.

A second frame **213** is associated below the sole **204**, approximately at the heel region **212**; said second frame, too, is U-shaped in transverse cross-section, forming a

second base **214** for anchoring to the sole **204**, two second wings **215a** and **215b** protruding from said second base, at least one pair of second wheels **216a** and **216b** being pivoted between said second wings.

An adapted brake **217** is advantageously associable at the quarter **203** and has a pad **218** that interacts with the ground when said cuff is rotated backwards.

A first hole **219** and second holes **220a**, **220b** are formed, along the same axis, respectively at the first tab **210** and at the second tabs **211a** and **211b**; said holes accommodate a pivot **221** that also passes at adapted third holes **222a** and **222b** formed at the first wings **207a** and **207b** of the first frame **206** proximate to the first base **209**.

At least one means adapted to limit the oscillation of the second frame **213** and/or of the shell **202** is interposed between the lower surface of the sole **204** and the first base **209**; the means is constituted by a flexible insert **223** that is preferably rectangular in plan view and has a hole which allows the insertion of the first tab **210**.

The second frame **213** has two third tabs **224a** and **224b** that protrude from the second wings **215a** and **215b** towards the first frame **206** and have such a length and size as to be arranged laterally adjacent outside the second tabs **211a** and **211b** that protrude from the sole **204** and the ends of the first wings **207a** and **207b** of the first frame that are adjacent to the first base **209**.

Advantageously, the profiles of the first wings and of the pair of third tabs have narrower portions that allow to contain the length of the pivot **221**.

The two third tabs **224a** and **224b** are slightly curved towards the sole **204**, and are perforated at the tip in order to be pivoted to the pivot **221**.

The operation of the invention is as follows: during thrusting, which is shown schematically in FIG. **10**, the skater can lift the second frame **213** by the presence of the pair of third tabs **224a** and **224b**, localizing forces exclusively at the first frame **206** and therefore at the first wheels **208a** and **208b**.

Furthermore, use of the particular configuration of the second frame and of the pair of third tabs allows to shift the rotation point at the axis of the pivot **221** directly below the sole of the shell.

It has been observed that the invention has achieved the intended aim and objects, since it is adapted to transmit forces in an optimum manner during thrusting and at the same time allows a correct anatomical movement of the foot.

The presence of the pair of third tabs in fact allows, while having a monolithic shell, to lift the second frame, so that the user can transmit forces, during thrusting, selectively only at the front part of the foot, at the same time allowing to achieve optimum lateral containment and rigidity of the entire skate throughout sports practice.

With reference to FIGS. **12–15**, the reference numeral **301** designates a skate constituted by a shell **302**, whereto it is possible to articulate a quarter **303** associated at the malleolar region by means of appropriate studs or rivets.

The shell **302** is formed monolithically, is preferably made of plastics, and has a lower region that forms a sole **304**.

A first frame **306** is associated below the sole **304** in the metatarsal region **305** and is U-shaped in transverse cross-section; at least one pair of first wheels **308a** and **308b** is pivoted between the first wings **307a** and **307b** of said first frame, which protrude towards the ground.

The first frame **306** has a first base **309** for interconnecting the first wings **307a** and **307b**; said base is perforated, so as



to form a seat for the positioning of a first tab **310** in said base, and said first tab protrudes below the sole **304** in the metatarsal region **305**.

A pair of second tabs **311a** and **311b** also protrudes below the sole **304** so as to lie approximately parallel to the first tab; said second tabs are arranged externally with respect to the first wings **307a** and **307b** of the first frame.

A second frame **313** is also associated below the sole **304**, approximately at the heel region **312**; said second frame, too, is U-shaped in transverse cross-section, forming a second base **314** for anchoring to the sole **304**, two second wings **315** protruding from said second base; at least one pair of second wheels **316a** and **316b** is pivoted between said second wings.

An adapted brake **317** is advantageously associable at the quarter **303** and has a pad **318** which interacts with the ground when said cuff is rotated backwards.

A first hole **319** and second holes **320a**, **320b** are formed, along the same axis, respectively at the first tab **310** and at the second tabs **311a** and **311b**; said holes accommodate a pivot **21** that also passes at adapted third holes **322a** and **322b** formed at the first wings **307a** and **307b** of the first frame **306** proximate to the first base **309**.

At least one means adapted to limit the oscillation of the second frame **313** and/or of the shell **302** is interposed between the lower surface of the sole **304** and the first base **309**; said means is constituted by a flexible insert **323** which is preferably rectangular in plan view and has a hole that allows the insertion of the first tab **310**.

The skate also has a rigid connecting element **324** that is adapted to connect the first frame, the second frame, and the shell to one another; said connecting element is constituted by two profiles that are L-shaped and therefore have respective third wings **325** and fourth wings **326**; the tips of said wings are pivoted respectively at the pivot **321** and at the pivoting axis of the second wheel **316a** of the second frame **313** that is adjacent to the first frame **306**, which is arranged in front.

Advantageously, the profiles constituting the connecting element are arranged outside the first and second frames.

It is also possible to advantageously provide narrower portions, adapted to contain the extension of the pivot **321**, at the first frame and at the third wings **325**.

The third wings **325** and the fourth wings **326** are thus arranged approximately parallel to the first wings **307a** and **307b** and to the second wings **315** of the respective first and second frames, so as to allow mutual sliding.

The elbow of the connecting element **324**, which joins the third wing **325** and the fourth wing **326**, is furthermore arranged approximately at the first wheel **308b** of the first frame **306** that is adjacent to the second frame **313**, where each profile is pivoted at the first wheel **308b** and therefore between the first wings **307a** and **307b** of the first frame **306**.

Additional means for limiting the oscillation of the second frame and/or of the shell are constituted by at least one lug **327** that protrudes at least from one of the first wings **307a** and **307b** in a region lying to the rear of the perimetric edge of the third wings **325** that is directed towards the heel region **312**; said lug is arranged so as to abut against the perimetric edge of the third wings **325** in the inactive condition in which all the wheels rest on the ground.

The operation of the invention is as follows: during thrusting, which is shown schematically in FIG. 14, the skater can lift the second frame **313** by the presence of the connecting element **324**, localizing forces exclusively at the first frame **306** and therefore at the first wheels **308a** and **308b**.

Furthermore, use of the L-shaped profile for the connecting element allows to shift the rotation point at the axis of the first wheel of the first frame and therefore in a point that is very close to the ground and is anatomically favorable for the rotation of the foot during thrusting.

It has been observed that the invention has achieved the intended aim and objects, since it is adapted to transmit forces in an optimum manner during thrusting and at the same time allows a correct anatomical movement of the foot.

The connecting element in fact allows, while having a monolithic shell, to lift the second frame, so that the user can transmit forces, during thrusting, selectively only at the front part of the foot, at the same time allowing to achieve optimum lateral containment and rigidity of the entire skate throughout sports practice.

With reference to FIGS. 16–17, the reference numeral **401** designates a skate constituted by a shell **402**, to which it is possible to articulate a quarter **403** that is associated at the malleolar region by means of appropriate studs or rivets.

The shell **402** is formed monolithically, is preferably made of plastics, and has a lower region that forms a sole **404**.

The shell **402** has, proximate to the tip region **405**, an articulation **406** constituted by a slit that is formed on an approximately transverse plane starting from the vicinity of the sole **404**; said slit forms a first flap **407a** and a second flap **407b** having such a shape as to allow their partial overlap, even in the inactive condition, and particularly the insertion of the first flap **407a** in the second flap **407b**.

During sports practice, while thrusting and flexing the foot, the mutual overlap of the first and second flaps **407a** and **407b** increases, thus facilitating the flexing of the foot.

The first and second flaps **407a** and **407b** have, proximate to the sole **404**, a curved shape that is adapted to form a circular recess **408**; said recess **408** allows to improve the flexibility, and therefore the overlap, of said first and second flaps **407a** and **407b**.

The articulation **406** forms, for the shell **402**, a first front body **409a** that is arranged at the tip region **405** starting from the flap **407a**; said first body **409a** allows to contain and secure the front part of the foot.

The articulation **406** also forms a second body **409b** which, starting from the second flap **407b**, allows to contain and secure the rear part of the user's foot.

A first frame **410a** is associated in a downward region with the first body **409a**; the transverse cross-section of said frame is U-shaped, and at least one pair of first wheels **411a** and **411b** is pivoted between the first wings of said frame, which protrude downwards.

The first frame **410a** is constituted by a first flat base **412a** for connecting the first wings, which is connected below the sole **404** through the interposition of adapted connecting means, such as rivets, that are accommodated in a complementarily shaped first seat **413a** that is formed on the sole **404** that lies below the first body **409a**.

The first wings of the first frame **410a** protrude in the opposite direction with respect to the tip region **405**.

A second frame **410b** is also associated, in a downward region, with the second body **409b** in the region of the heel **415**; said second frame is U-shaped in a transverse cross-section, and at least one second pair of wheels **414a** and **414b** is pivoted between its second wings, which protrude below a second connecting base **412b**.

The second base **412b** is connected to the sole **404** through the interposition of adapted connecting means, such



as rivets or couplings inserted at a complementarily shaped second seat **413b** formed on the sole **404** at the heel region **415**.

The second base **412b** is preferably narrower than the first base **412a**, so as to allow the partial insertion and adjacent arrangement, along approximately parallel planes, of the second wings of the second frame **410b** with respect to the first wings of the first frame **410a**.

The first and second frames **410a** and **410b** have means **416** for their mutual guiding and sliding.

Said means **416** are constituted by a pivot **417** that is associated and blended at right angles with respect to the tins of the first wings of the first frame **410a** in a region that is intermediate between two of said first and second wheels that are adjacent to each other; the first pivot **417** slides at a slot **418** that is formed on the second wings of the second frame **410b** that are adjacent to the first wings of the first frame **410a**.

The slot **418** has a curved shape, the concavity whereof is directed at the tip region **405**.

The pivot **417** can be arranged at the upper end of the slot **418** if the pair of first wheels **411a** and **411b** and the pair of second wheels **414a** and **414b** rest on the ground, generally designated by the reference numeral **419**; during thrusting, instead, as shown in FIG. 17, the foot flexes, and the second body **409b** and therefore the second frame **410b** rise, forcing the sliding of the pivot **417** inside the slot **418** until it reaches the lower end of said slot, which constitutes a stroke limiter.

Advantageously, the first frame **410a** and the second frame **410b** have, on each one of said first and second wings, respectively a first hole **420a** and a second hole **420b**, which have the same axis in the inactive condition, are arranged above the means **416**, and allow the insertion of a pivot or screw that allows to lock the skate **401** in the horizontal condition, so that the pair of first and second wheels **411a** and **411b**, **414a** and **414b** rest on the ground **419** so as to prevent, according to the user's requirements, the rotation of the skate **401**.

A conventional brake **421** is associated with the skate **401** to the rear.

The operation of the skate is as follows: during thrusting, the flexing of the foot and the rise of the rear part thereof is allowed by the articulation **406** formed on the shell **402**, which is provided by the mutual overlap of the first and second flaps **407a** and **407b** of the first and second bodies **409a** and **409b**.

The connection of the second body **409b** to the second frame **410b** allows the latter to rise with respect to the ground **419**, whereas the sliding of the pivot **417** in the slot **418** allows guided lifting.

It has been observed that the invention has achieved the intended aim and objects, said invention being adapted to transmit forces in an optimum manner during thrusting, at the same time allowing a correct anatomical movement of the foot; the articulation **406** provided on the shell **402** in fact allows to flex the foot naturally, producing more thrust for an equal physical effort.

The sliding and guiding means **416** allow to lift the second frame **410b** so that the user can thus transmit forces, during thrusting, selectively and exclusively at the front region of the foot; at the same time, said means **416** allow to achieve optimum lateral containment and rigidity of the entire skate throughout sports practice.

FIG. 18 illustrates still a further embodiment, in which the numeral **501** designates a skate constituted by a shell **502**.

The shell **502** is constituted by a first front body **509a**, which is arranged proximate to the toe region **505** and adapted to surround it, and by a separate second rear body **509b**, to which a quarter **503** can be articulated.

The first and second bodies **509a** and **509b** have, respectively, a first sole **504a** and a second sole **504b** which are transversely and rotatably associated with each other, at their ends that can be arranged mutually adjacent, by means of a hinge-like articulation that comprises an adapted transverse connecting screw or pivot **534**.

The first and second bodies **509a** and **509b** have, respectively, a first flap **507a** and a second flap **507b**, which have such a shape as to allow their partial overlap, even in the inactive condition, and particularly the insertion of the first flap **507a** in the second flap **507b**.

A frame **510** is associated below the first body **509a** and has a U-shaped transverse cross-section; at least one pair of first and second wheels, designated respectively by the reference numerals **511a** and **511b**, **514a** and **514b**, is pivoted between the first wings of said frame, which protrude downwardly.

The frame **510** is connected, in a downward region, to the first sole **504a** of the first body **509a** through the interposition of adapted connecting means, such as rivets or couplings, that are accommodated in a complementarily shaped seat **513** formed on said first sole **504a**.

This solution, too, allows to achieve the intended aim and objects, since the second body can rise from the frame during thrusting, which becomes localized, i.e., entrusted to the front region.

The materials and the dimensions constituting the individual components of the skate according to the invention may be the most appropriate according to the specific requirements.

What is claimed is:

1. Skate with in-line wheels comprising:

an upper for accommodating a user's foot, said upper having a front portion and a rear portion and a longitudinal extension extending between said front portion and said rear portion said front portion and said rear portion being mutually pivotable with respect to one another during a pivoting use configuration of the skate about a transverse axis extending transversely with respect to said longitudinal extension;

a wheel supporting frame downwardly connected to said upper;

a plurality of in-line wheels rotatably supported by said wheel supporting frame;

said wheel supporting frame comprising a first frame member and a second frame member, said first frame member being downwardly connected to said front portion of said upper and said second frame member being downwardly connected to said rear portion of said upper and said first frame member being rotatably connected with said second frame member substantially about said transverse axis such that said first frame member rotates with respect to said second frame member substantially about said transverse axis when said front portion and said rear portion of said upper mutually pivot with respect to one another during said pivoting use configuration of the skate.

2. Skate according to claim 1, wherein said first and second frame members are U-shaped and respectively have first and second wings protruding downwardly from said upper and between which said plurality of wheels are



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pivotably supported, portions of said first wings being arranged in overlapping contact with portions of said second wings for providing lateral force transmission of said frame members.

3. Skate according to claim 1 further comprising guiding and mutual sliding means for slidably guiding said first frame member with respect to said second frame member when said first and second frame members rotate with respect to each other during said pivoting use configuration of the skate.

4. Skate according to claim 1, wherein said upper comprises a monolithic shell forming said front portion and said rear portion and having, proximate to a sole of the skate and in a front foot region, at least one articulation which pivotably connects said front portion and said rear portion of said upper.

5. Skate according to claim 2, further comprising:

a plurality of first tabs protruding downwardly and axially with respect to said front portion of said upper at first ends of said first frame member that face second ends of said second frame member, said first tabs protruding both externally and in an interspace that lies between said first wings of said first frame member; and

a plurality of second tabs that protrude downwardly and axially at said second end of said rear portion of said upper that is directed towards said front portion of said upper, both externally and in the interspace that lies between said second wings.

6. Skate according to claim 2, comprising guiding and sliding means for slidably guiding said first frame member with respect to said second frame member when said first and second frame members rotate with respect to each other during said pivoting use configuration of the skate, said guiding and sliding means comprising a pivot that is connected to said first wings of said first frame member and slideable at a slot formed on said second wings that are adjacent to said first wings, said slot being curved with a concavity directed towards said pivot.

7. Skate according to claim 5, further comprising a plurality of third tabs that protrude downwardly at said second end of said rear portion of said upper having said second tabs, said third tabs protruding externally with respect to said second wings.

8. Skate according to claim 7, wherein said first, second, and third tabs have a comb-shaped configuration arranged adjacent to each other when said front and rear portions of said upper are joined axially.

9. Skate according to claim 8, wherein adapted first, second, third, fourth, and fifth holes are formed on said first, second, and third tabs and on said first and second ends of said first and second frame members, along the same axis, all of said holes constituting a seat for a first pivot.

10. Skate according to claim 9, wherein said first pivot has a head, which abuts against one of said third tabs, and a stem, which is internally threaded at an end opposite said head for coupling to a complementarily threaded first screw that abuts at another one of said third tabs.

11. Skate according to claim 10, further comprising guiding and sliding means provided on said first and second frame members and including a second pivot that passes at two sixth holes formed at ends of said first wings that partially laterally wrap around corresponding ends of said second wings of said second frame.

12. Skate according to claim 11, further comprising two adapted slots formed on said corresponding ends of said second wings, said slots having an arc-like shape that allows said rear portion of said upper and said second frame

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member to rise from the ground during thrusting, when first wheels of said plurality of in-line wheels supported by said first frame member are in contact with the ground.

13. Skate according to claim 12, wherein said two slots are formed on said second wings at said sixth holes provided on said first wings of said first frame member.

14. Skate according to claim 13, further comprising, respectively on said first and second wings of said first and second frame members, a seventh hole and an eighth hole that are adjacent to said sixth holes and to said pair of slots and have the same axis in a use configuration of the skate in which both said first wheels and second wheels of said plurality of in-line wheels supported by said second frame member interact with the ground and therefore with the skate in a horizontal condition.

15. Skate according to claim 14, wherein said seventh and eighth holes form a temporary seat for a pivot or a pin that is removable and allows to block said first and second frame members from mutually pivoting.

16. Skate according to claim 15, wherein said first and second pivots act at an interspace that is provided between adjacent wheels of said first and second wheels of said plurality of in-line wheels.

17. Skate according to claim 3, wherein said front portion of said upper is U-shaped in transverse cross-section and comprises a first flat support from which two lateral shoulders protrude upward for containing a front part of a shoe or of a foot at a tip region, said front portion of said upper having a first strap with ends which are connectable with said two lateral shoulders so as to secure said shoe or said foot.

18. Skate according to claim 3, wherein said first and second frame members are U-shaped and have respectively first and second downward-protruding wings between which said plurality of wheels are rotatably supported, said second wings of said second frame member having a center distance that is smaller than a center distance of said first wings of said first frame member so as to allow a partial insertion and mutually adjacent arrangement of said second wings with respect to said first wings along approximately parallel planes.

19. Skate according to claim 17, wherein said rear portion of said upper comprises a second flat support from which a heel cup protrudes perimetrically upward and is adapted to contain at least a heel region of said shoe or said foot, said rear portion having a second strap with ends which are laterally associated with said heel cup to secure said shoe or foot at a foot instep region.

20. Skate according to claim 19, wherein said front and rear portion of said upper are rotatably associated with each other by means of a hinge articulation comprising a screw or a connecting pivot arranged at ends of said front and rear portions of said upper arranged adjacent to each other.

21. Skate according to claim 4, wherein said articulation, provided proximate to a tip region of said shell, comprises a slit that is formed on an approximately transverse plane with respect to said longitudinal extension starting adjacent said sole, said slit forming at least a first flap and a second flap of said shell that have such a shape as to allow a partial mutual overlap of said first and second flaps and particularly an insertion of said first flap in said second flap.

22. Skate according to claim 21, wherein said front portion is formed starting from said first flap for containment and securing of a front part of the user's foot, and said rear portion is formed starting from said second flap for containment and securing of a rear part of the user's foot.

23. Skate according to claim 22, wherein said first frame member is U-shaped in a transverse cross-section and has



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first wings which protrude downwards from said front portion, said first frame member further comprising a first flat base for connecting said first wings.

24. Skate according to claim 23, wherein said first wings of said first frame member protrude downwardly from said tip region.

25. Skate according to claim 24, wherein said second frame member is U-shaped in transverse cross-section and has second wings which protrude downwardly on said rear portion, said second frame member further comprising a second connecting base, said second connecting base for connecting said second wing.

26. Skate according to claim 25, wherein said second base is narrower than said first base, so as to allow partial insertion and adjacent arrangement, on approximately parallel planes, of said second wings of said second frame member with respect to said first wings of said first frame member.

27. Skate according to claim 26, further comprising a pivot that is connected with said first wings of said first

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frame member, said pivot being slideable at a slot that is formed on said second wings that are adjacent to said first wings.

28. Skate according to claim 27, wherein said slot has a curved shape, with a concavity directed towards said pivot, said pivot being arranged at an upper end of said slot when all of said plurality of wheels rests on the ground, said pivot being furthermore slideable inside said slot until it reaches the lower end, which forms a stroke limit, during thrusting.

29. Skate according to claim 28, wherein said first and second frame members have, on each one of said first and second wings, respectively a first hole and a second hole having a same axis in an inactive horizontal condition of said wheel supporting frame to allow an insertion of a pivot or screw that allows to lock said skate in the horizontal condition so as to prevent a mutual rotation of said first and second frame members.

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